Planets Around Other Stars

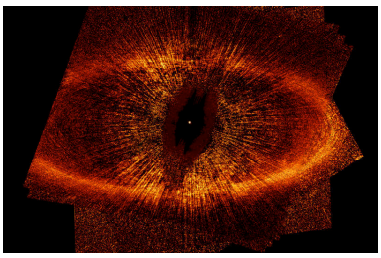
A Summary by Andrew Fraknoi *(Foothill College)* (November 2008)

Astronomers have now discovered planets around many other stars and more are being found all the time. As of Nov. 15, 2008, we found 278 stars that have one or more planets, 326 different planets, and 33 multiple-planet systems (in the sense that our solar system has multiple planets).

◊ There are 3 main ways of discovering planets around other stars:

1. **The "wiggle and wobble" method** – We detect the planet by the tiny changes it causes in its star's motion. (The star is bright, the planet is impossibly dim. So we watch the star wiggle as a planet orbits around it and pulls it ever so slightly to one side and then the other.)
2. **The transit method** – We find the planet when it moves across the face of its star, and the light output of the star goes down by a tiny amount (like a mini-eclipse).
3. **The "seeing is believing" method** -- We actually take a picture of the planet (⇓ NEW)

There are other ways too, including finding a hint of a planet around a young star when the disk of disk around it shows an empty space near the middle (this first made Fomalhaut suspicious.)



credit: NASA Hubble

Some Interesting Trends in the Planets Discovered So Far

- 92 planets take less than 10 days to orbit (and are therefore "indecently close" to their stars) – astronomers call these "hot Jupiters," because their masses are comparable to Jupiter, but they orbit so close to their star that you would get french-fried there.
- 132 planets take less than 88 days to orbit (closer to their stars than Mercury is to the Sun!)
- Bear in mind, however, these are just the sorts of planets our wiggle technique is best at finding first. What kind of planets would pull on their stars the most? The ones that have considerable mass (like Jupiter) and are *close* to their stars. And since their "years" are so short, it doesn't take long to find the whole cycle of wiggles. If "hot Jupiters" are common, it is not surprising they will be the first ones found. As the years pass, we are finding more planets further away from their stars. As of Nov. 15, 2008, we know 90 planets that orbit farther out than Mars does in our system (take longer than 687 days to orbit their star).
- 33 stars have more than one planet orbiting them: 22 stars have 2 planets, 9 stars have 3, one star has 4, and 1 star has 5. There are hints of more such planetary systems in the data.
- The planets we have been discovering have masses larger than Earth's. Mostly we have been finding planets of Saturn or Jupiter's mass or larger, but a number of newly discovered planets are now lower in mass. As our techniques get better, we expect to be able to find more and more lower-mass planets.
- In the future, missions in space (like Kepler) may help us find planets of even smaller mass
- One intriguing question is whether "Jupiters" in Earth-like orbits could have moons that are the mass of the Earth and have atmospheres.

For more information, see: exoplanet.eu, exoplanets.org, planetquest.jpl.nasa.gov, www.seti.org